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TITLE: Stable non-aqueous compositions containing peracids which are substantially insoluble

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US-CL-CURRENT: 510/371; 252/186.42, 510/304, 510/310, 510/374, 510/418, 510/461, 510/530, 8/111

CLAIMS:

We claim:

1. A non-aqueous liquid composition comprising a liquid phase which comprises (1) from 5 to 75% by wt. of a nonionic surfactant or mixture of surfactants at least one of which surfactants in the mixture is a nonionic surfactant; and (2) a solid phase comprising;

(a) from 0.1 to 10% by wt. peroxyacid having a solubility of less than about 1500 ppm active oxygen when said peracid is dispersed in said nonionic surfactant wherein said peroxyacid is a dipercarboxylic amido or imido acid selected from the group consisting of:

(1) dipercarboxylic acids having the formula: ##STR3## wherein: R.sup.4 is selected from the group consisting of C.sub.1 -C.sub.12 alkylene, C.sub.5 -C.sub.12 cyoloalkylene, C.sub.6 -C.sub.12 arylene and radical combinations thereof;

R.sup.5 is selected from the group consisting of hydrogen, C.sub.1 -C.sub.16 alkyl and C.sub.6 -C.sub.12 aryl radicals and a carbonyl radical that can form a ring together with R.sup.3 ;

R.sup.6 is selected from the group consisting of hydrogen, C.sub.1 -C.sub.16 alkyl and C.sub.6 -C.sub.12 aryl radicals and a radical that can form a C.sub.3 -C.sub.12 ring together with R.sup.3 ;

R.sup.3 is selected from the group consisting of C.sub.1 -C.sub.12 alkylene, C.sub.5 -C.sub.12 cycloalkylene and C.sub.6 -C.sub.12 arylene radicals;

n' and n" each are an integer chosen such that the sum thereof is 1;

m' and m" each are an integer chosen such that the sum thereof is 1; and

M is selected from the group consisting of hydrogen, alkali metal, alkaline earth metal, ammonium and alkanolammonium cations and radicals;

(b) about 1% to about 80% by wt. of a builder or mixture of builders selected from the group consisting of polycarboxylate builders, sodium sulfate and zeolites; and

(c) 0.5 to 25% by wt. buffer compound or mixture of buffer compounds selected from the group consisting of borate, boric acid and bicarbonate;

wherein the half-life stability of the peracid in the final composition, when measured at 37.degree. C. is 5 days or greater.

2. A composition according to claim 1, wherein said peroxyacid has a solubility less than 1000 ppm active oxygen when said peracid is dispersed in said nonionic surfactant.

3. A composition according to claim 2, wherein said peroxyacid has a solubility less than 750 ppm active oxygen when said peracid is dispersed in said nonionic surfactant.

4. A composition according to claim 3, wherein said peroxyacid has a solubility less than 500 ppm active oxygen when said peracid is dispersed in said nonionic surfactant.

5. A composition according to claim 4, wherein said peroxyacid has a solubility less than 200 ppm active oxygen when said peracid is dispersed in said nonionic surfactant.

6. A composition according to claim 1, wherein said composition is selected from the group of peroxyacids consisting of
N,N'-Di(4-Percarboxybenzoyl)ethylenediamine (PCBED),
N,N'-Terephthaloyl-di(6-aminopercarboxycaproic acid) (TPCAP),
N,N'-Di(4-percarboxybenzoyl)piperazine (PCBPIP),
N,N'-Di(4-Percarboxybenzoyl)-1,4-diaminocyclohexane (PCBHEX),
N,N'-Di(4-Percarboxybenzoyl)-1,4-butanediamine (PCBBD),
N,N'-Di(4-Percarboxyaniline)terephthalate (DPCAT),
N,N,N'N'-1,2,4,5-tetracarboxybenzoyl-di(6-aminopercarboxycaproic acid) (DiPAP),
N,N'-Di(percarboxyadipoyl)phenylenediamine (DPAPD),
N,N'-Succinoyl-di(4-percarboxy)aniline (SDPCA), C.sub.3 analog of
N,N'-Terephthaloyl-di(4-amino peroxybutanoic acid) (TPBUTY) and C.sub.9 analog of N,N'-Terephthaloyl-di(8-amino peroxyoctanoic acid) (TPOCT).

7. A composition according to claim 1, where the nonionic surfactant is liquid at room temperature.

8. A composition according to claim 1, where the zeolite builder is zeolite P.

9. A composition according to claim 1, wherein said polycarboxylate builder is a citrate.

10. A composition according to claim 1, wherein the solid phase further comprises an amount of enzyme sufficient to provide enzyme detergency.

11. A composition according to claim 10, wherein said enzyme is selected from the group consisting of proteases, lipases, amylases, cellulase, oxidases and mixtures thereof.

12. A composition according to claim 10, wherein said enzyme is incorporated into the composition in the form of an enzyme slurry.

13. A composition according to claim 12, wherein said enzyme slurry is a slurry of an enzyme in a nonionic surfactant or a slurry of enzyme particles in a silicone oil or a silicone antifoam.

14. A non-aqueous liquid composition according to claim 1, wherein the liquid phase (1) comprises a nonionic surfactant, the solid phase (2)(b) comprises

zeolite and the solid phase (2)(c) comprises borate.

15. A composition according to claim 14, wherein the solid phase (2) further comprises an amount of enzyme or enzymes sufficient to provide enzyme detergency.

16. A composition according to claim 15, wherein the enzyme is incorporated into the composition in the form of an enzyme slurry.

17. A non-aqueous liquid composition according to claim 1, wherein the liquid phase (1) comprises a nonionic surfactant and the solid phase (2)(b) comprises citrate and the solid phase (2)(c) comprises borate.

18. A composition according to claim 17, wherein the liquid phase further comprises an amount of enzyme or enzymes sufficient to provide enzyme detergency.

19. A composition according to claim 17, wherein the enzyme is incorporated into the composition in the form of an enzyme slurry.

20. A composition according to claim 14, which additionally comprises an acid builder.

21. A composition according to claim 20, wherein the builder is a polycarboxylic acid or salt.

22. A composition according to claim 21, wherein the builder is a polycarboxylic acid which is citric acid.

23. A composition according to claim 20, wherein the liquid phase is a mixture which comprises, in addition to nonionic surfactant, a surfactant acid.

24. A composition according to claim 23, wherein the surfactant acid is alkyl benzene sulfonic acid.

25. A composition according to claim 20, further comprising an amount of enzyme or enzymes sufficient to provide enzyme detergency.

26. A process for making a non-aqueous liquid composition according to claim 1 which process comprises mixing said liquid phase and solids from said solid phase, grinding said solids to required particle size and subsequently adding said peracid or enzyme or mixtures thereof.

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Brief Summary Text (4):
Peroxyacids have powerful oxidizing capacity which enables them to bleach household stains. These compounds also have powerful disinfectant and sanitizing properties which are generally superior to products which generate hydrogen peroxide when used under the same conditions.

Brief Summary Text (11):
U.S. Ser. No. 07/970,344, now abandoned, which application is assigned to applicants' assignee, teaches non-aqueous liquids containing an inorganic persalt, particularly sodium percarbonate, and precursor compounds which are relatively insoluble in the non-aqueous, liquid phase. The application is concerned with the insolubility of the precursor and not with the insolubility of the specific peroxyacids of the invention. Moreover, carbonate salts are outside the scope of salts which should be used to ensure peracid stability according to the subject invention.

Brief Summary Text (47):
Non-surfactant solvents having structures falling in the preferred categories include ethers, polyethers, alkylamines and fatty amines (especially di-, and tri-alkyl and/or fatty N substituted amines), alkyl (or fatty) amides and mono- and di- N-alkyl substituted derivatives thereof, alkyl (or fatty) carboxylic acid lower alkyl esters, ketones, aldehydes and polyamides. Examples include di-alkyl ether, polyethylene glycols, alkyl ketones (such as acetone) and glyceryl trialkylcarboxylates (such as glyceryl triacetate), glycerol, propylene glycol, and sorbitol.

Brief Summary Text (60):
In general, zeolite P has silicon to aluminum ratio not exceeding 1.33; a water content of the zeolite material less than 25% based on hydrated zeolite and has a calcium binding capacity of at least 150 mg CaO per gram of anhydrous material.

Brief Summary Text (64):
wherein Z and Y are integers of at least 6, the molar ratio of Z to Y is in the range from 1.0- to 0.5, and x is an integer from 6 to 189 such that the moisture content is from about 4% to about 25% by weight (termed herein, `partially hydrated`). This water content provides the best rheological properties in the liquid. Above this level (e.g., from about 19% to about 28% by weight water content), the water level can lead to network formation. Below this level (e.g., from 0 to about 6% by weight water content), trapped gas in pores of the material can be displaced which causes gassing and tends to lead to a viscosity increase also. However, it will be recalled that anhydrous materials (i.e., with 0 to about 6% by weight of water) can be used as structurants. The preferred range of aluminosilicate is from about 12% to about 30% on an anhydrous basis. The aluminosilicate preferably has a particle size of from 0.1 to 100 microns, ideally between 0.1 to 10 microns and a calcium ion exchange capacity of at least 200 mg calcium carbonate/g.

Brief Summary Text (96):
Thus during manufacture, it is preferred that all raw materials should be dry and

(in the case of hydratable salts) in a low hydration state, e.g., anhydrous phosphate builder, sodium perborate monohydrate and dry calcite abrasive, where these are employed in the composition. In a preferred process, the dry, substantially anhydrous solids are blended with the liquid phase in a dry vessel. In order to minimize the rate of sedimentation of the solids, this blend is passed through a grinding mill or a combination of mills, e.g., a colloid mill, a corundum disc mill, a horizontal or vertical agitated ball mill, to achieve a particle size of 0.1 to 100 microns, preferably 0.5 to 50 microns, ideally 1 to 10 microns. A preferred combination of such mills is a colloid mill followed by a horizontal ball mill since these can be operated under the conditions required to provide a narrow size distribution in the final product. Of course, particulate material already having the desired particle size need not be subjected to this procedure and if desired, can be incorporated during a later stage of processing.

Detailed Description Text (13):
To show that the low solubility levels in model continuous phase (i.e., nonionic alone) would be expected to correlate with equally low solubility in the continuous phase of a full nonaqueous liquid (NAL) formulation, three peracids (PCBPIP, PCBHEX and DIPAP) were further tested in an NAL as set forth below: